PATENT SPECIFICATION

Inventor: GERD HINRICHS

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COMPLETE SPECIFICATION

Improvements in Metal-Impregnated Synthetic Carbon Materials

We, SCHUNK & EBE G.M.B.H., a German company of Postfach 119, Giessen 16, Germany, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to metal-impregnated synthetic carbon materials suitable for use in the manufacture of packings, contacts and sliding current collectors.

Synthetic carbon, as commonly known, may be impregnated with heavy metals and metal alloys of various types such as lead, copper, silver, tin or alloys of these metals, in order to increase the resistance of the carbon to fracture and abrasion, to reduce its pore volume and its specific electrical resistance. Such impregnated carbon materials are used for the manufacture of trolley bows or shoes for taking up current for driving electrical vehicles from trolley wires or from current rails and of switch contacts. Owing to its small pore volume impregnated carbon is also very suitable for packing purposes such as for carbon ring packings in steam turbines, pumps and compressors.

However, the physical properties of the carbon material are modified by such impregnation in a manner which is not exclusively favourable. For example the considerable increase in density is very unfavourable to the use of the material in large carbon contact bows, such as those used on standard-gauge railways and tramways, where the weight of the contact bow sliding on the trolley wire should be low, so that the bow can follow the trolley wire easily and as far as possible without inertia in any position.

However, it is not only in this respect that a heavy metal impregnation, particularly of lead, tin or an alloy thereof, which are perforated for their low melting points, may give unfavourable results in practice. It is often found that for some reason the starting of an electric vehicle having a trolley bow made of carbon impregnated with heavy metal is difficult. It is known that the current collecting material may then become heated to 300° C. or more with the result that an impregnating metal with a low melting point, such as lead, will be forced out of the carbon to an extent depending on how long the heating is maintained. Therefore, if often starting the trolley or the like is difficult it is just a matter of time when the metal has completely sweated out of the carbon.

In impregnated synthetic carbon in accordance with the invention high resistance to fracture and abrasion, and low electrical resistance, are combined with a density which is very little different from that of unimpregnated carbon and the ability to withstand the considerable heating which may occur in practice, without any change in structure. According to the invention, all the desired beneficial properties are combined by impregnating synthetic carbon with aluminium or aluminium alloy such as an aluminium silicon alloy or an aluminium magnesium silicon alloy the specific gravity of which is between 2.6 and 2.9 and in which the aluminium content predominates considerably. "Silumin" alloy has proved to be particularly suitable for impregnating synthetic carbon. It has a specific gravity of 2.7 and a melting point of about 570° C., its electrical conductivity being 26 mho/square millimetre per metre. By way of comparison, copper has a conductivity of 58 mho/square millimetre per metre:—

EXAMPLE.

When impregnating a hard synthetic carbon with about 20% by weight "Silumin", which may be done, for example, by dipping into a metallic melt in a heatable vacuum apparatus, its density is increased from about 1.55 gram per cubic centimetre to 1.85—1.90 gram per cubic centimetre.

[*Price 3s. 6d.*] Price 4s 6d

Price 25p

The breaking strength as compared with an unimpregnated carbon increases from approximately 250 to higher than 800 kg/cm², while the electrical conductivity is increased from 0.025 mhos/centimetre cube to 0.25 mhos/centimetre cube or less.

The very slight increase in density also makes it readily possible for contact bows with a contact bar impregnated with metal in this manner to be used in place of bows with unimpregnated contact bars without loss of mobility of the current collector. Furthermore, owing to the considerably increased conductivity combined with the increased breaking strength, the cross-section of such bows serving to pick up current may be considerably reduced.

Since a typical light metal alloy, such as silumin, may have a melting point of 570° C., there is no reason to expect that the impregnated metal will be forced out of the contact bow by any heating which may occur such as that discussed above.

The usefulness of switch contacts such as those used in controllers is similarly enhanced when they are impregnated with the metal described above. Their specific resistance is lowered as described above from 40 to 4 ohm/square millimetre per metre resulting in a reduction of burning of the switch contacts and a marked longer life.

What we claim is:—

1. An electrical contact, sliding current collector or packing made from a synthetic carbon impregnated with aluminium or an aluminium alloy having a specific gravity between 2.6 and 2.9 in which the aluminium content predominates considerably.

2. A contact, collector or packing according to Claim 1 in which the carbon is impregnated with silumin or other aluminium silicon alloy or an aluminium magnesium silicon alloy.

3. A contact, collector or packing according to Claim 2, in which the carbon is impregnated with about 20% of silumin.

4. An electrical contact, sliding current collector or packing made of a material substantially as described in the example herein.

For the Applicants:
LLOYD WISE, BOULY & HAIG,
Chartered Patent Agents,
10, New Court, Lincoln's Inn,
London, W.C.2.

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